[FOR THE USE OF MEMBERS.]

Royal Institution of Great Britain.

1852.

31.

WEEKLY EVENING MEETING,

Friday, March 12.

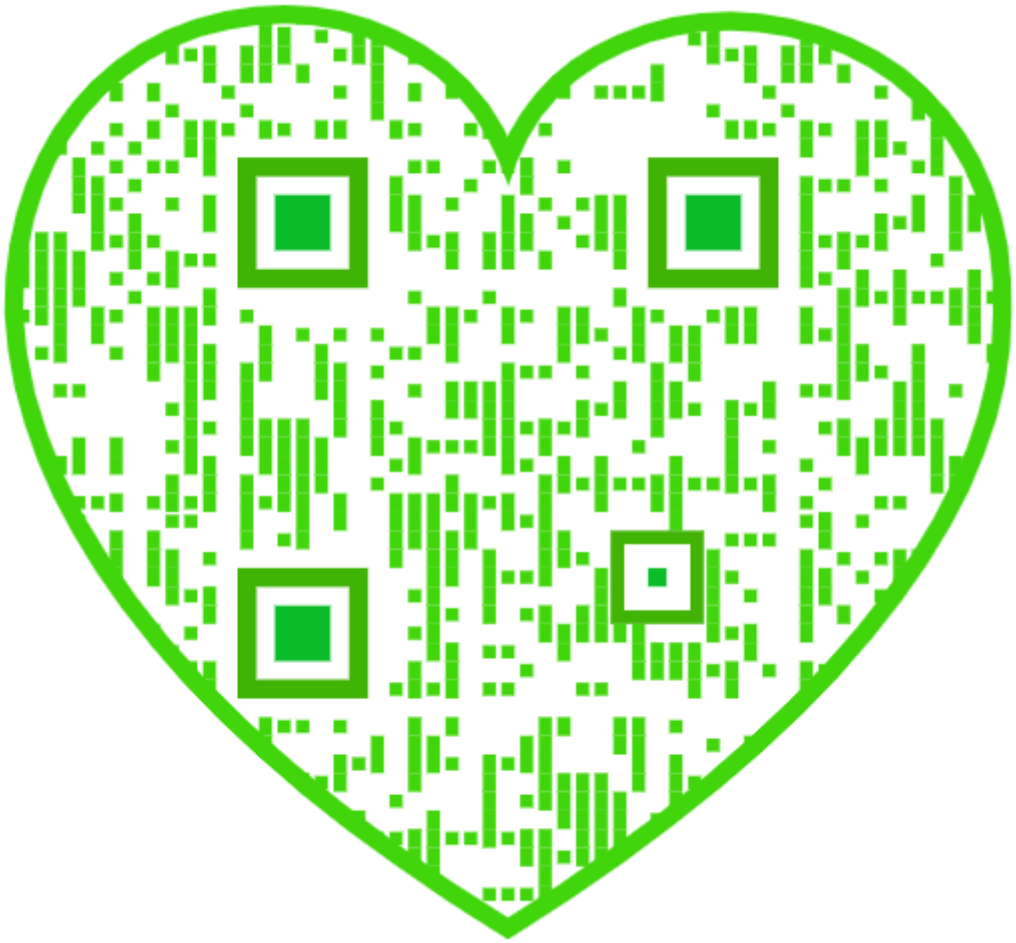
Sir CHARLES LEMON, Bart., LL.D., F.R.S.
in the Chair.

WILLIAM B. CARPENTER, M.D., F.R.S., &c.

On the Influence of Suggestion in Modifying and directing Muscular Movement, independently of Volition.

PUBLIC attention has recently been so much attracted to a class of phenomena, which has received the very inappropriate designation of *Electro-Biological*, or simply *Biological*, and so much misapprehension prevails regarding their true nature and import, that it becomes the Physiologist to make known the results of scientific investigation, directed in the first place towards the determination of their genuineness, and in the second to the elucidation of the peculiar state of the nervous system on which their production depends.

With regard to the genuineness of the phenomena themselves, the Lecturer stated that he could entertain no doubt whatever; since they had been presented to himself and to other scientific enquirers, by numerous individuals, on whose honesty and freedom from all tendency to deceive themselves or others implicit reliance could be placed. But from the account commonly given of these phenomena,—to the effect that the *will* of the 'biologized' subject is entirely subjected to that of the operator,—he entirely dissented; and believed that he should be able to show that the state in question is essentially one of *reverie*, in which the voluntary control over the current of thought is entirely suspended, the individual being for the time (so to speak) a mere *thinking automaton*, the whole course of whose ideas is determinable by suggestions operating from without. The 'biologized' individual cannot get rid of any notion with which he thus becomes possessed, by any effort of his own; because the abeyance of his voluntary power alike prevents him from directing the current of his thoughts into another channel, and from having recourse to his ordinary experience for the correction of its fallacies; and so long as he is under its domination, all his conversation and actions are nothing else than an expression of it. A condition very



similar to this is often seen in that form of artificial somnambulism which is termed 'hypnotism' by Mr. Braid, and less frequently in natural somnambulism.*

But it is the peculiar feature of the 'biological' state, that the subject of it is still awake, that he has generally the use of all his senses, and that he has in most cases a perfect recollection of what has taken place, when he returns to his ordinary state of mental activity, though sometimes the recollection does not extend to particulars.

All the phenomena of the 'biologized' state, when attentively examined, will be found to consist in the occupation of the mind by the *ideas* which have been suggested to it, and in the influence which these ideas exert upon the actions of the body. Thus the operator asserts that the 'subject' cannot rise from his chair, or open his eyes, or continue to hold a stick; and the 'subject' thereby becomes so completely possessed with the fixed belief of the impossibility of the act, that he is incapacitated from executing it, *not* because his will is controlled by that of another, but because his will is in abeyance, and his muscles are entirely under the guidance of his ideas. So again, when he is made to drink a glass of water, and is assured that it is coffee, or wine, or milk, that assurance, delivered in a decided tone, makes a stronger impression on his mind than that which he receives through his taste, smell, or sight; and not being able to judge and compare, he yields himself up to the 'dominant idea.'† Here, again, we perceive that it is not really the *will* of the operator which controls the *sensations* of the subject; but the *suggestion* of the operator which excites a corresponding *idea*, the falsity of which is not corrected, simply because the mind of the subject, being completely engrossed by it, cannot apprehend the truth less forcibly impressed on it through his own senses. Not only muscular movements, but other bodily changes, attest the

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* In natural somnambulism, the mind is generally engrossed by some 'dominant idea' of its own, and cannot be directed by external suggestions, except such as may be in harmony with it. There are numerous instances on record, however, (among the best known of which is that of the Officer who served in the expedition to Louisburgh in 1758, and at whose expense his comrades were accustomed to amuse themselves, as narrated by Dr. James Gregory) in which the current of thought and the course of action of a natural somnambulist have been entirely governed by the suggestions of those around.

† It is very curious to observe, in some instances, the perplexity arising from the contrariety between the opposing sensory impressions. The mind seems unable to reconcile this contrariety, and yields itself up to the impression which is most strongly felt. Sometimes it is convinced by the repeated assurances of the operator, so long as the *taste* alone is opposed to them, but attaches a superior importance to the indications of *sight*; in other individuals, again, the indications of sight may be put aside, and yet the 'subject' cannot be made to believe what is in opposition to his sense of taste. There are some individuals who can never be thus played upon, notwithstanding that their muscular movements and their purely mental conceptions are completely amenable to this kind of direction.

reality of this domination; thus a biologized subject may be brought to feel the apartment so intensely hot, that a perspiration breaks out upon his skin; or he may be so persuaded of its coldness, that he forthwith begins to shiver; and sleep may often be induced, by assuring him that in a few minutes he will be obliged to give way to it. In a case witnessed by the Lecturer, a lady to whom chloroform had been twice administered (so that she was aware of the the mode of its action) was made to believe that she was again inhaling it; she soon passed into the usual insensibility, and remained perfectly unconscious for a few minutes, after which she came to herself in the manner she would have done if she had really been under the influence of chloroform.

The same general statement applies to what has been designated as 'control over the memory.' The subject is assured that he cannot remember the most familiar thing, his own name for example; and he is prevented from doing so, not by the will of the operator, but by the conviction of the impossibility of the mental act, which engrosses his own mind, and by the want of that voluntary control over the direction of his thoughts, which alone can enable him to *recal* the desiderated impression. And the abolition of the sense of personal identity,—Mr. A. believing himself to be Mrs. B., or Mrs. C. believing herself to be Mr. D., and acting in conformity with that belief,—is induced in the same mode; the assurance being continually repeated, until it has taken full possession of the mind of the 'subject,' who cannot so direct his thoughts as to bring his familiar experience to antagonize and dispel the illusive idea thus forced upon him.

Now almost every one of these peculiar phenomena has its parallel in states of mind whose existence is universally admitted. Thus the complete subjection of the muscular power to the 'dominant idea' is precisely what is experienced in *nightmare;* in which we are prevented from moving so much as a finger, notwithstanding a strong desire to do so, by the conviction that the least movement is impossible. The misinterpretation of sensory impressions is continually seen in persons who are subject to *absence of mind,* who make the most absurd mistakes as to what they see or hear, taste or feel, in consequence of the pre-occupation of the mind by some train of thought, which renders them unable rightly to appreciate the objects around them. In such persons, too, the memory of the most familiar things,—as the absent man's own name, for example, or that of his most intimate friend,—is often in abeyance for a time; and it requires but a more complete obliteration of the consciousness of the past, through the entire possession of the mind by the intense consciousness of the present, to destroy the sense of personal identity. This, indeed, we often do in effect lose in ordinary *dreaming* and *reverie.* The essential characteristic of both these states, as of the 'biological' condition, is the suspension of voluntary control over the current of thought, so that the ideas follow one another *suggestively;*

and, however strange or incongruous their combinations or sequences may appear, we are never surprised at them, because we have lost the power of referring to our ordinary experience. It is well known that the course of ordinary dreams is often determined by impressions received through the organs of sense, although the individual may not be conscious of them *as such;* and those who are prone to reverie are well aware that the direction of their thoughts depends in many instances, not merely upon the previously existing associations between their ideas, but upon the excitement of new ideas by external impressions.

There is one phenomenon of the 'biological' state, which has been considered pre-eminently to indicate the power of the operator's will over his subject; namely, the induction of sleep, and its spontaneous determination at a given time previously ordained, or by the sound of the operator's voice, and that only. It is well known that the *expectation* of sleep is one of the most powerful means of inducing it, especially when combined with the withdrawal of the mind from everything else which could keep its attention awake; both these conditions are united in an eminent degree in the state of the biologized subject, whose mind has been possessed with the conviction that sleep is about to supervene, and is closed to every source of distraction. Nor need the waking at a given time, or upon a given sound (and upon that only), be accounted at all more strange; for it is a matter of familiar experience, that this is often determined, in the case of an ordinary sleeper, by the impression under which he passes into unconsciousness; the fixed intention to awake at a certain hour being productive of the exact consequence; and the habit of attention to a particular sound, as that of a clock, bell, voice, &c., causing the sleeper to awake upon the slightest provocation from it, although his slumbers are not broken by noises of far greater intensity.

Thus, then, however strange the phenomena of the 'biological' state may at first sight appear, there is not one of them, which, when closely scrutinized, is not found to be essentially conformable to facts whose genuineness every physiologist and psychologist is ready to admit. And the chief marvel is, that a state in which these phenomena are so easily and constantly producible, should be capable of being induced by so simple a process as that of gazing for a time at a small fixed object at arm's length from the eyes.*

It is not, however, in any large proportion of individuals, that this state can be induced; probably not more than one in twenty, or at most one in twelve. Males appear equally susceptible of it with

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* The "Electro-Biologists," as they term themselves, at first maintained that a wonderful virtue resided in the little disk of copper with a zinc centre, to which they directed the gaze of their 'subjects.' It is now universally admitted, however, that *any* object which serves as a *point d'appui* for the fixed gaze, is equally efficacious.

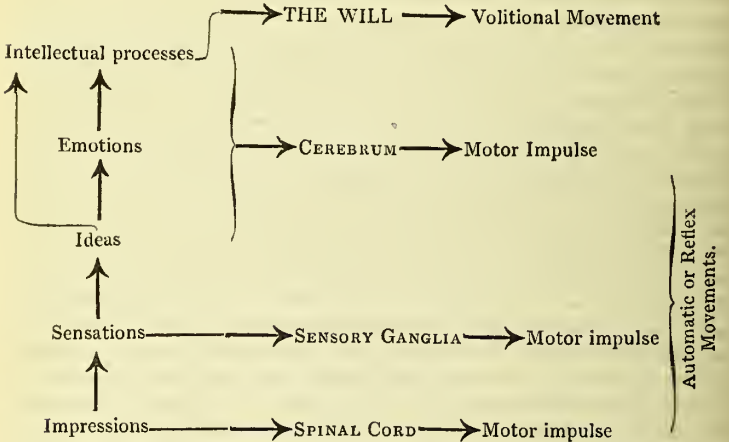
females ; so that it cannot be fairly set down as a variety of 'hysterical' disorder. Generally speaking, those who have most of the power of voluntary abstraction are most easily affected in this mode; more especially if, at the same time, they are of an excitable or imaginative temperament.

It now remains to enquire, whether any such Physiological account can be given of this state, as shall enable us to refer it to any of the admitted laws of action of the Nervous system. This, the Lecturer stated, was the point which he was most desirous of elucidating; and in order to prepare his auditors for the reception of his views, he gave a brief explanation of those phenomena of 'reflex' action (now universally recognized by Physiologists), in which impressions made upon the nervous system are followed by respondent automatic movements. Such movements have hitherto been distinguished into the *excito-motor*, which are performed, without the exciting impression being necessarily felt, through the instrumentality of the Spinal Cord and the nerves connected with it; and the *sensori-motor*, in which sensation necessarily participates, the respondent motions not being executed unless the impressions are felt, and their instrument being the chain of Sensory Ganglia (collectively constituting the 'sensorium') which lies between the Spinal Cord and the Cerebrum, and is intimately connected with both. The automatic movements of breathing and swallowing, which continue during a state of profound insensibility, are examples of the former group; whilst the start upon a loud sound, the closure of the lids to a flash of light, or the sneezing induced by dazzling of the eyes, as well as by irritation in the nasal passages, are instances of the latter. The whole class of purely *emotional* movements may be likened to these; for in so far as they are involuntary, and depend upon the excitation of certain states of mind by external impressions, they must be considered as 'reflex' in the general sense of that term.

Now the usual *modus operandi* of sensations is to call forth *ideas* in the mind; and these ideas, associated or not with emotional states, become the subjects of intellectual processes, which result at last in a determination of the Will. The movements which we term *voluntary* or *volitional* differ from the emotional and automatic, in being guided by a distinct conception of the object to be attained, and by a rational choice of the means employed. And so long as the Voluntary power asserts its due predominance, so long can it keep in check all tendency to any other kind of action, save such as ministers directly to the bodily wants, as the automatic movements of breathing and swallowing.

The *Cerebrum* is universally admitted to be the portion of the nervous system, which is instrumentally concerned in the formation of ideas, the excitement of the emotions, and the operations of the intellect; and there seems no reason why it should be exempted from the law of 'reflex action' which applies to every other part of

the nervous system.* And as we have seen that the *emotions* may act directly upon the muscular system through the motor nerves, there is no *a priori* difficulty in believing that *Ideas* may become the sources of muscular movement, independently either of volitions or of emotions.— The relations of these different modes of action of the nervous system, and the place which this *ideo-motor* form of 'reflex' operation will hold in regard to the rest, will be made more apparent by the following tabular arrangement.



Now if that ordinary *upward* course of external impressions, — whereby they successively produce sensations, ideas, emotions, and intellectual processes, the will giving the final decision upon the action to which they prompt, — be anywhere interrupted, the impression will then exert its power in a *transverse* direction, and a 'reflex' action will be the result. This is well seen in cases of injury to the Spinal Cord, which disconnects its lower portion from the sensorium without destroying its own power; for impressions made upon the lower extremities then excite violent reflex actions, to which there would have been no tendency if the current of nervous force could have passed upwards to the Cerebrum. So, if sensations be prevented by the state of the Cerebrum from calling forth ideas through its instrumentality, they may react upon the motor apparatus in a manner which they would never do in its state of complete functional activity. This the Lecturer maintained to be the true account of the mode, in which the locomotive movements are maintained and guided in states of profound abstraction, when the whole attention of the individual is so completely concentrated upon his

* To Dr. Laycock is due the credit of first extending the doctrine of reflex action to the Brain.

own train of thought, that he does not *perceive* the objects around them, although his movements are obviously guided by the impressions which they make upon his sensorium. And he adverted to a very remarkable case, in which the functional activity of the Cerebrum seemed to have been almost entirely suspended for nearly a twelvemonth, and all the actions of the individual presented the automatic characters of consensual and reflex movements.

On the same grounds, it seems reasonable to suppose that when *ideas* do not go on to be developed into emotions, or to excite intellectual operations, they, too, may act (so to speak) in the transverse direction, and may produce respondent movements, through the instrumentality of the Cerebrum; and this will of course be most likely to happen, when the power of the Will is in abeyance, as has been shown to be the case in regard to the direction of the thoughts, in the states of Electro-biology, Somnambulism, and all forms of Dreaming and Reverie. Here the movements express the ideas that may possess the mind at the time; with these ideas, emotional states may be mixed up, and even intellectual operations may be (as it were) automatically performed under their suggestive influence. But so long as these processes are carried on without the control and direction of the Will, and the course of thought is entirely determined by suggestions from without, (the effects of which, however, are diversified by the mental constitution and habits of thought of the individual) such movements are as truly automatic, as are those more directly prompted by sensations and impressions, although originating in a more truly *psychical* source. But the automatic nature of the purely emotional actions can scarcely be denied; and as it is in those individuals in whom the intellectual powers are the least exercised, and the controlling power of the Will is the weakest, that the Emotions exert the strongest influence on the bodily frame, so may we expect Ideas to act most powerfully when the dominance of the Will is for the time completely suspended.

Thus the *ideo-motor* principle of action finds its appropriate place in the physiological scale, which would, indeed, be incomplete without it. And, when it is once recognized, it may be applied to the explanation of numerous phenomena which have been a source of perplexity to many who have been convinced of their genuineness, and who could not see any mode of reconciling them with the known laws of nervous action. The phenomena in question are those which have been recently set down to the action of an "Od-force," such, for example, as the movements of the 'divining-rod,' and the vibration of bodies suspended from the finger; both which have been clearly proved to depend on the state of *expectant attention* on the part of the performer, his Will being temporarily withdrawn from control over his muscles by the state of abstraction to which his mind is given up, and the *anticipation* of a given result being the stimulus which directly and involuntarily prompts the muscular movements that produce it.

[W. B. C.]

In the Library were exhibited : —

Testimonial (in silver) to Dr. Conolly, by Messrs. Hunt and Roskell.

Geological Section of Well sunk at the Bank of England, Jan. 1852. [Exhibited by Thomson Hankey, jun. Esq., Governor of the Bank.]

Two Cases of Indian Butterflies — Lion's Cubs — an Elephant's Tusk, — from the United Service Institution.

Sundhya, or Daily Prayers of the Brahmins, illustrated by Mrs. S. C. Belnois — Japanese Sandals, Reaping-hook, Pen and ink case, Telescope-tube, Playing-Cards, Tea-kettle, and Tobacco-pouch — Chinese and Japanese Dictionary — Tablet of Earth from tomb of Ali, used at their devotions by the Mahometans of the Shiah Sect, — from the Royal Asiatic Society.

Femur of the Plesiosaurus, from the Kimmeridge Clay, Bucks — Ammonites heterophyllus — Vertebræ of Ichthyosaurus from Lias, Lyme, Dorset — Fossil wood, &c. [Exhibited by Mr. Tennant.]

Varley's Microscope with Lever stage movement, shewing Infusoria, Rotatoria, Monoculi or Water fleas, in which the *heart* was seen *beating*, and all their internal structure, their eggs, their young, and the muscles which move the eyes.

WEEKLY EVENING MEETING,

Friday, March 19.

Wm. Pole, Esq., M.A., F.R.S., Treasurer and Vice President, in the Chair.

J. J. Bigsby, M.D., F.G.S.,

Member of the American Philosophical Society (late British Secretary to the Canadian Boundary Commission),

On the Physical Geography, Geology, and Commercial Resources of Lake Superior.

[The following statements are partly derived from the able reports and charts of Messrs. Bayfield, Logan, Foster, Owen, and others in the service of the governments of Great Britain and the United States, Dr. Bigsby's own researches on the northern shores of the Lake, for 440 miles, having supplied the remainder.]

Lake Superior is included between W. Longitude 84° 18′ and 92° 19′ — and N. Latitude 46° 29′ — 49° 1′. It is to the east of, and near to, the swell of high land which, stretching from the Rocky Mountains to Lake Superior, in wide undulating plains,